Space Weather Forecast

Issued on Sunday 6 October 2024 at 01:10 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: CME imminent, G1/G2 Expected, Chance G3 over remainder of UTC weekend. R1/R2 Expected throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity remained at high levels, again owing to proximity of the background flux to Moderate-class, with any minor increases producing low-level Moderate-class X-ray flares (rather than any larger Strong-class activity). These flares peaked at 05/2320UTC from the largest and most complex sunspot in the southwest. Also observed was a similar-sized flare at 05/0844UTC, apparently from a sunspot region near the eastern solar horizon, although the cadence of observing imagery has been impaired over the period.

There are now seven sunspot groups, with two previous groups crossing the western solar horizon and a third fading in the east. The southwest quadrant remains heavily populated with large and complex regions. The largest both showed consolidation and slight areal growth of the main leading spots. Changes in the eastern solar hemisphere were much slower and more limited.

There is a large 'filament' (arc of plasma) in the south central part of the Sun - given its location this is something to monitor for any possible Coronal Mass Ejection (CME) should it destabilise.

CME activity in the period was generally confined to high latitudes narrowly over the western solar horizon - to no effect at Earth. No new Earth-directed CMEs were in evidence.

Solar Wind / Geomagnetic Activity: The awaited Strong-class flare-related CME from 03 October appears to have reached a near-Earth satellite as of 05/1943UTC. The shock here is co-aligned with Earth's field, but recent hours have revealed subsequent deviations to anti-alignment. This satellite is around 25 degrees ahead of Earth and orbiting slightly closer in, however given the central location of the CME source, the CME front is likely to reach Earth's radius at a similar time here and on the Sun-Earth line.

The solar wind showed a slow regime with a slightly elevated speed. The number of particles in the solar wind density was within background levels. The associated magnetic field was slightly elevated at peak. The north-south component was variable, with no lasting co- or anti-aligned periods with Earth's field.

The net result of the above solar wind measures was provisionally mostly quiet geomagnetic activity.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be moderate to high, with occasional Moderate-class flares expected and a chance of isolated Strong-class flares. Recurrence does not suggest any returning large regions over the eastern solar horizon in the forecast period, however there should now be a slight depopulation of the southwestern quadrant by UTC midweek to slightly reduce the overall flare probabilities by this time.

Solar Wind / Geomagnetic Activity: The main CME arrival of the period is the imminent Strong-class-related event from 03 October. In the wake of this is a possible glancing CME impact from a Moderate-class flare and filament eruption combination on 04 October, passing Earth late on Monday 07 October.

The sole fast wind due in the period is due on Tuesday 08 October. This may be indistinguishable from the residual enhancements caused by the aforementioned CME arrivals that precede it. The most reliably quiet period should be the very end of the current four-day forecast period (barring any new CMEs).

G1-G2/Minor-Moderate Geomagnetic Storm periods are expected over the remainder of the current UTC weekend, due to the Strong-class-related CME's effects. There remains a chance of G3/Strong Geomagnetic Storm conditions and even a Slight Chance of isolated G4 intervals. Geomagnetic activity should then wane into the new UTC working week, but further G1 activity may result from any close pass of the Moderate-class-related CME later on 07 October and from a minor fast wind on 08 October, with each event probably less impactful than the last.

Energetic Particles / Solar Radiation: There is a daily chance of exceeding the S1/Minor Storm threshold should further significant flares occur.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	95	60	20	5
Strong	**G3**	No	50	5	1	1
Severe	**G4**	No	5	1	1	1
Extreme	**G5**	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	90	90	85	80
Very Active	R3-R5 (X Class)	No	25	25	25	20

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	25	25	25	20
Very Active	≥ S3 *	No	5	5	5	5
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.